(No Model.) 3 Sheets—Sheet 1.

F. F. LANDIS.

TRACTION ENGINE.

No. 294,794. Patented Mar. 11, 1884.

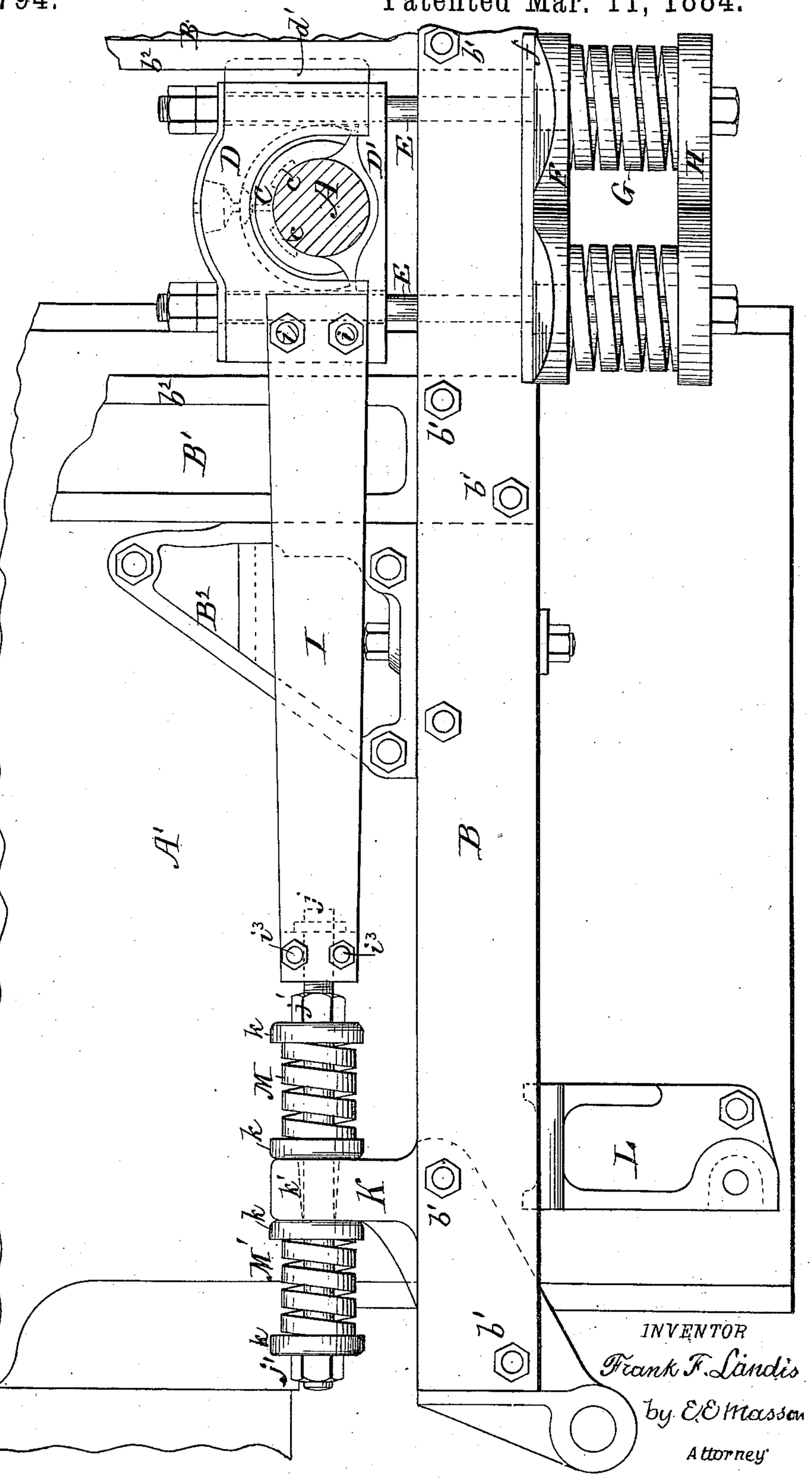

Fig. 1.

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(No Model.)

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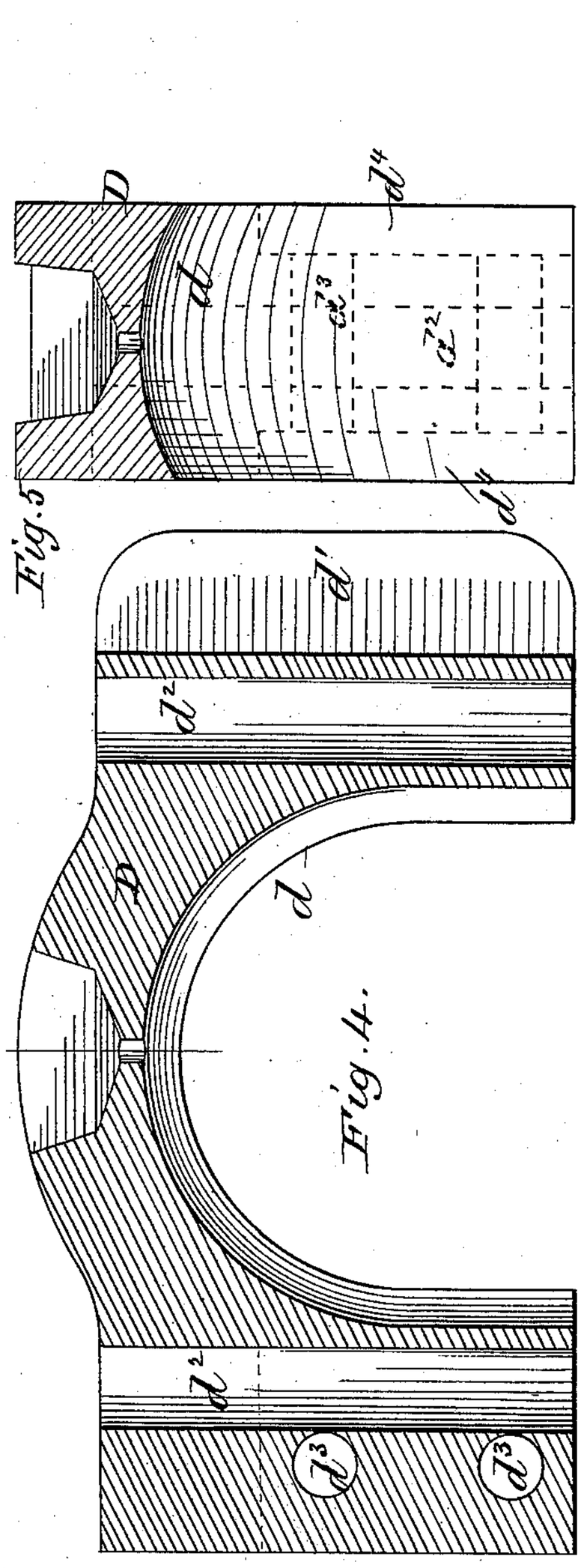

Fig. 5

Fig. 4.

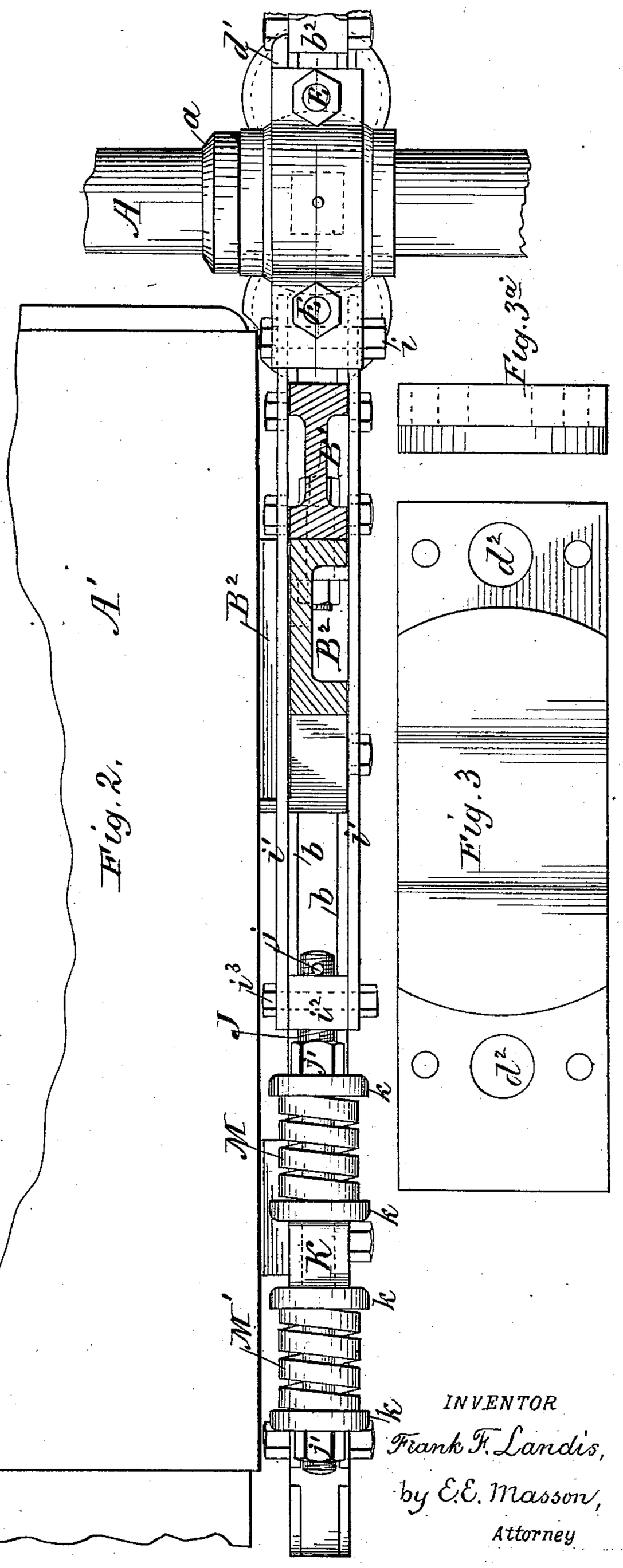

Fig. 2.

Fig. 3a

Fig. 3

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Fig. 6.

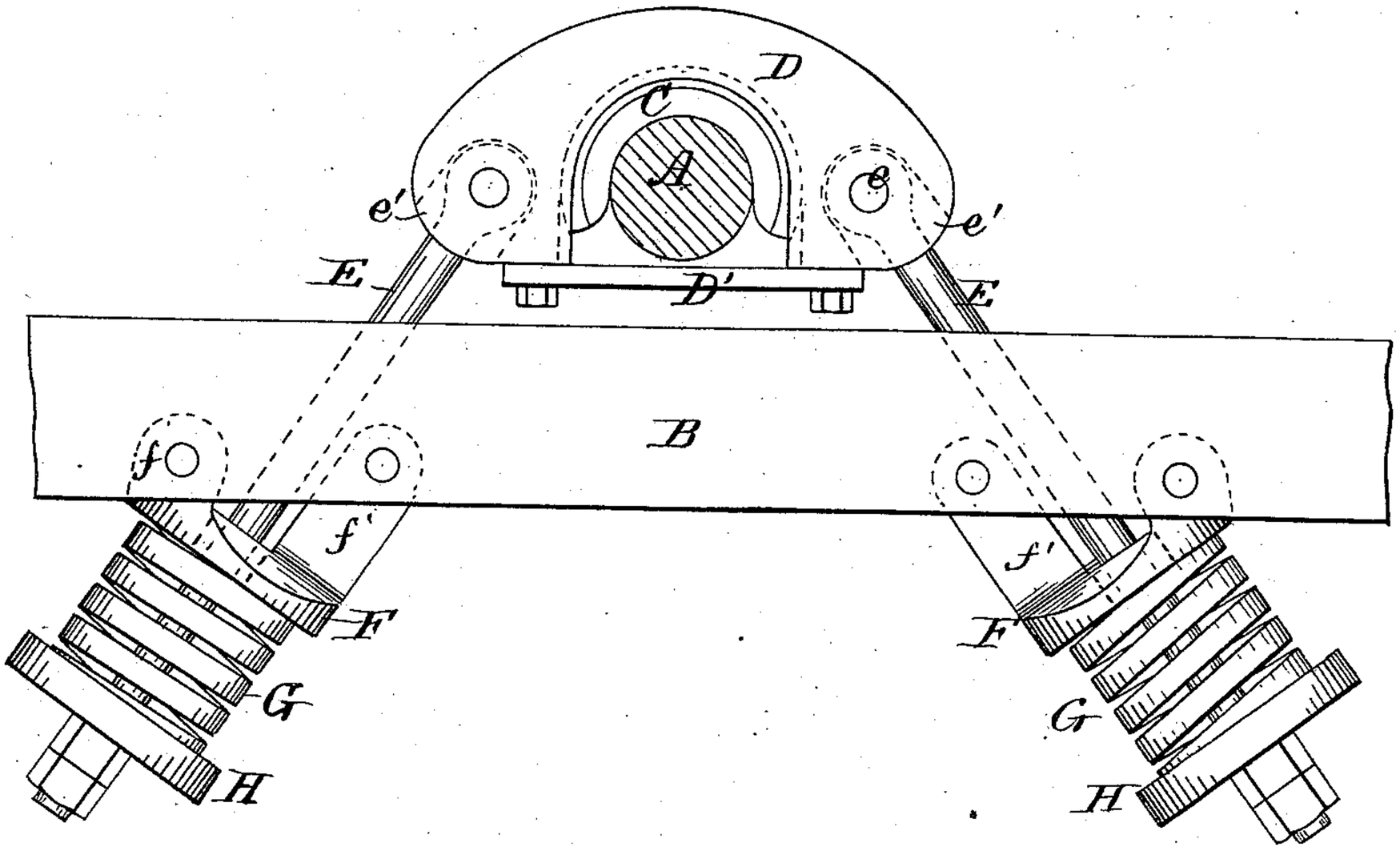
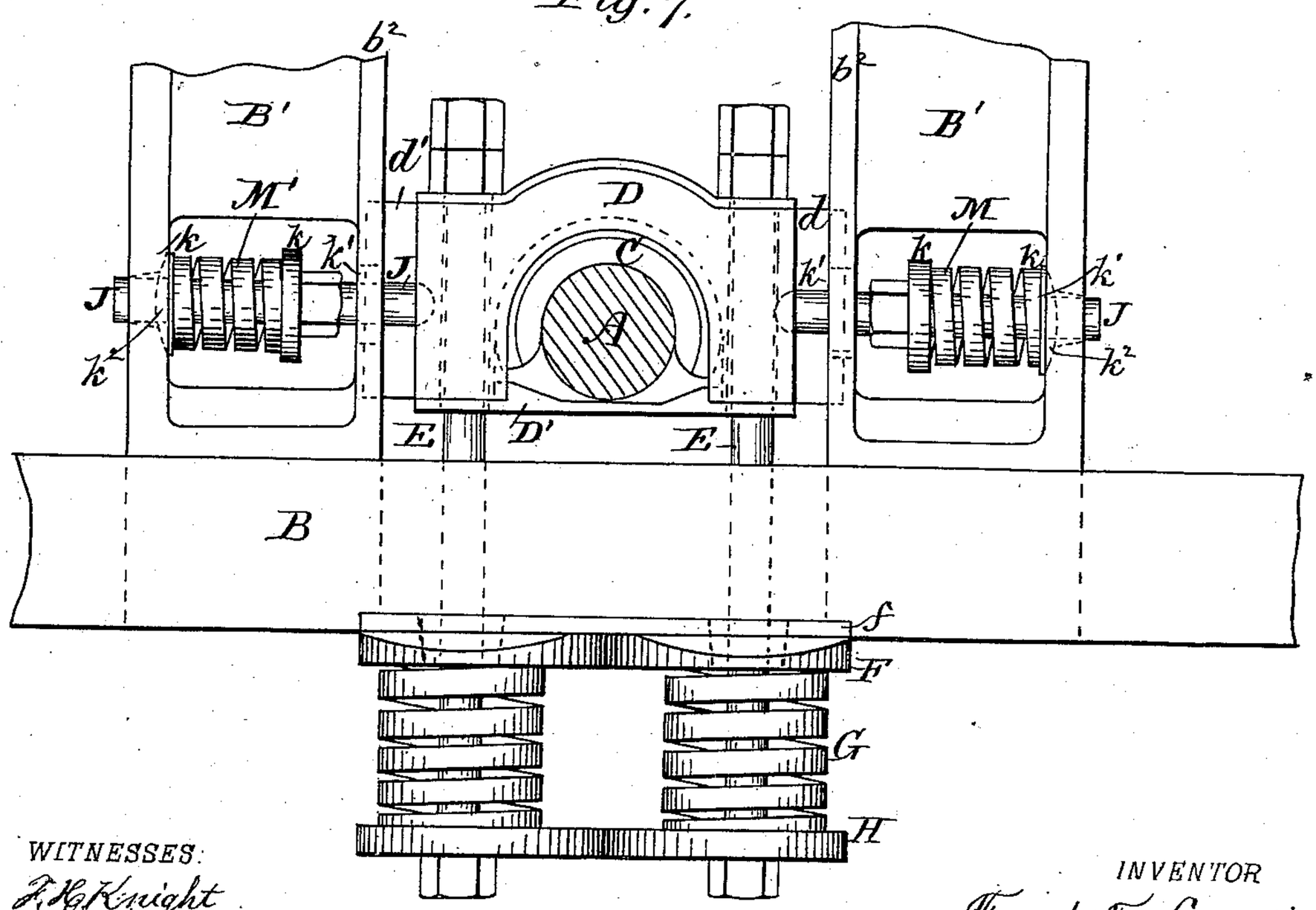


Fig. 7.



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UNITED STATES PATENT OFFICE.

FRANK F. LANDIS, OF WAYNESBOROUGH, PENNSYLVANIA.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 294,794, dated March 11, 1884.

Application filed March 21, 1883. (No model.)

To all whom it may concern:

Be it known that I, FRANK F. LANDIS, a citizen of the United States of America, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Traction-Engines, of which the following is a specification.

My invention relates to certain improvements in traction-engines and has in the present instance more particular reference to a novel principle of operation in the means employed for supporting and protecting the boiler against concussion, and involves a yielding or cushioned connection between the motor and the traction-wheels' bearings, and the objects of the adoption and embodiment of this principle of operation are in part to secure a more even carriage of the boiler—that is, to reduce to the minimum the jolting, pitching, and rolling of the boiler to which this class of engines are subjected by the roughness and obstructions met with in common roadways, and to reduce the friction of the main-axle bearings against the housings while thus traveling or pulling a load. These and other important objects of my present invention will hereinafter more fully appear, and to attain them I employ, broadly speaking, a yielding connection or cushion located between the motor and the main point of resistance, and also form an element of support for some one of the power directing or conveying devices; and, as shown herein, I have selected as the preferable point at which to locate or utilize the yielding or cushioning effect or principle the traction-axle bearings, though it is evident that various modifications of the means and location thereof for the embodiment of said principle may be employed. Some of such modifications are herein fully illustrated and described, while others will readily suggest themselves to persons skilled in the art of engine construction, and I therefore deem it proper to state that any such which embodies the principle of an intermediate cushioning device between the motor and traction-wheels which has the property of yielding in horizontal directions, is comprehended within my invention.

Referring to the drawings, Figure 1 is a side elevation of so much of a traction-engine constructed in accordance with my invention as is necessary to a clear understanding of the same. Fig. 2 is a plan of Fig. 1, and part in a horizontal section. Fig. 3 is a plan of one of the axle-bearing bottom straps; Fig. 3ª, an end elevation of the same; Fig. 4, a longitudinal vertical section of one of the axle-bearings, and Fig. 5 a transverse vertical section of the same; Figs. 6 and 7, modified arrangements of the principal elements of the cushioning devices.

Like letters refer to like parts in all the figures.

A represents the traction-axle; A′, the boiler; B, a side sill of the frame-work, and B′ B′ the housings, in which the usual counter-shaft and axle have their bearings. All of these parts are shown in part only, and are, except as to certain details hereinafter described, of usual construction, and excepting also certain novel features, which are described and claimed in another case simultaneously pending herewith. The sill B is constructed of two plates, *b b*, bound together by bolts *b′*, passing through the interposed brackets and housing thus secured therein. The lower portion of the housing on each side of the boiler is provided with ways b^2 b^2, against which the bearing-box D slides when the boiler is jolting.

C is the bearing proper, and is substantially crescent-shaped, and formed to fit the axle A, and is in part retained longitudinally thereon by a shoulder, *a*, formed on the axle, and has its top convex transversely to fit a similar concavity, *d*, in the bearing-box D. The bearing is grooved for the insertion of Babbitt or any other suitable metal, as shown at *c c*, Fig. 1.

The box D is provided at its rear end with a vertical flange or cheek, *d′*, which bears against the inner side of the way b^2, and is vertically bored at d^2 d^2 and transversely bored at d^3 d^3. An oil duct and well are formed at the top, as shown, and if desired any suitable covering or a separate oil-cup may be secured to the bearing in the usual well-known manner.

The vertical holes d^2 are provided for the passage therethrough of the suspension-rods

E E, which pass between the plates *b b* of the sill and through an upper and lower tie-plate, F and H, and interposed spiral coiled or other suitable springs, G. The upper plate, F, is provided with flanges *f*, whereby the plate is held from transverse displacement from the sill, and these flanges may project upward between the sills, or they may be secured to the sill-plates, as hereinafter described.

The transverse holes d^3 are provided for the passage of the bolts *i i*, which bind to the bearing-box D the yielding draft and thrust-bar I, consisting of two plates, *i' i'*, the rear ends of which are by the bolts *i i* firmly drawn against, or, as shown and preferred, into seats d^4 d^4, formed in the sides of the box D. (See dotted lines, Figs. 2 and 5.) The front ends of the plates *i* are firmly bound to a block, i^2, by bolts i^3, which block is perforated and screw-tapped to receive the screw-threaded end of a rod, J, through which a pin, *j*, is put, to prevent its after rotation. As plainly shown in Fig. 2, the plates *i' i'* embrace the front portion of the frame B' and the bracket B^2, which is secured to the boiler.

Between the plates *b b*, constituting the sill B, and at the front end of the side of the fire-box portion of the boiler, is secured, by bolts *b' b'*, a bracket, K, the lower portion of which is extended to form bearings for a transverse shaft employed in guiding mechanism forming no part of my present invention. The bracket L is also fully described in another case.

The rod J is screw-threaded at each end and provided with nuts *j*, and is encircled by two coil-springs, M M', one on each side of the bracket K, and at each end of each spring is a disk, *k*. The perforation through the bracket is larger at the rear than at the front, as clearly shown by dotted lines *k'* in Fig. 1.

As thus far described the following principles of operation and advantages are apparent: The weight of the entire load is thrown upon and supported by the traction-axle at the bearings D, (one only being shown, the other being, as is evident, at the opposite side of the boiler,) and the load is yieldingly supported in that position. The strain upon the suspension-rods E E is transferred to and acts to compress the springs G G, and these allow a vertical vibration or movement of the axle and bearing in the frame-work, while the boiler and sills remain relatively motionless in that direction.

To provide against the displacement of the bearings C at times when the ground-wheels suddenly descend from obstructions, I provide cross-straps D', which are in such relative position to the axle as not to interfere with its required movement in the bearing, and yet sufficiently near to retain the bearing C in proper position. Furthermore, the convex and concave adjacent surfaces of the box and bearing give it a ball-and-socket characteristic, which permits of the desired freedom of movement of the axle. This latter feature is shown in a companion case herewith. Having thus provided for the vertical movement of the axle and consequent relative smoothness of carriage in a vertical manner, it will be readily seen that as the ground-wheels meet an obstruction, and before mounting the same, and also at the times of starting and stopping, particularly when drawing one or more loaded wagons, there is a power exerted longitudinally which greatly increases the friction of the axle-bearings against the guideways b^2 of the housings B', and would, without provision for its diffusion, occasion sudden and more or less destructive strains upon the frame-work and the boiler which is attached thereto, and not only a less smooth and even carriage of the same, but greater pitching of the water therein would result. I have therefore provided the thrust and draft bar I and its cushioning devices. The box D being shorter than the space from the way b^2 to its companion in the frame B', and the flange d' bearing against one of said ways, while the plates *i'* of the bar embrace the entire frame-work and opposite way, b^2, there are thus provided ample facilities for a longitudinal movement in either direction of the axle and its bearing, and a perfect retention of the latter in a vertical line of movement at the same time, so that when subjected to sudden or great longitudinal exertion or strain, as just described, said strain is diffused by the springs M M', in that, when starting, the former is compressed between the disks *k k* and against the rear side of the bracket K, and in the reaction, or when suddenly reversing a forward movement or starting from a rest to a backward movement, the companion spring M' diffuses the strain, and the reaction is further diffused by the spring M; and by beveling or enlarging the bore of the aperture in the bracket K this operation takes place readily, whether the axle-box D be normal, elevated, depressed, or passing from one to the other of these positions, so that, finally, at all times and under all circumstances of speed, load, track, or direction, the shocks, rolling, and pitching of the boiler and the adjacent mechanism are much lessened.

In Figs. 6 and 7 I have illustrated some of the many modified arrangements of the principle and elements employed in the embodiment of my invention which are capable of yielding, in a measure, the advantages sought. As shown in Fig. 7, I have located the effective cushioning devices of the thrust and draft bar in the frame-work or housings B'. The rod J, in this instance, is severed, to form two rods, and with their adjacent springs, M M', are seated in the frame-work, one in front and the other in the rear of the bearing D. The outer disk, *k*, in each instance being seated in a concavity, k^2, in the frame, and the perforations in the frame-work through which the rods J pass are beveled or enlarged, as shown at *k'*, while the inner ends of the rods

are rounded and rest in concavities in the box D.

By the arrangement shown in Fig. 6 I still further reduce the number of elements employed, and combine in one the functions of several, but still adhere to the same principle of operation, in that provision is made for diffusing the strains of sudden shocks and great exertion of power. In this arrangement the springs H and suspension-rods E are arranged diagonally to the axle, and at an angle to the sills and the caps F are secured to the same by means of the flanges or lugs *f*. The bearing D is shorn of its flanges, as it is not required to bear against the frame-work, but is connected directly to the suspension-rods E by bolts *e* passing transversely through said rods, and seats *e'* for the same formed in the lower portion of the bearing. These seats *e'* and the central openings in the upper disks or plates, F, are beveled to permit free movement therein in desired direction of the rods E. As thus relatively arranged, the axle at each end is free to move in a vertical or horizontal or any intermediate direction from or toward the sill, so that the springs H not only serve to yieldingly support the load, but also to diffuse the strain in starting, drawing a heavy load, or when meeting or mounting an obstacle by means of the rear spring, G, (for instance, the one shown at the right of the figure,) the reaction being diffused by the forward spring G, and in opposite strains diffusing and reacting in an opposite manner. Furthermore, in this construction the cushioning devices are adapted to other supporting-axles than the main or traction axle, and are therefore applicable to the forward truck of a traction-engine, and may be there used, if desired; but I deem these as sufficient to show the principle of my invention.

Having described my invention and its operation, what I claim as new, and desire to secure by Letters Patent, is—

1. In a traction-engine, the combination of a boiler and a boiler-supporting frame yieldingly suspended from a traction-axle, with a yielding thrust and draft bar connecting the frame and axle-bearings, substantially as and for the purpose described.

2. In a traction-engine, the combination of a traction-axle, a frame-work yieldingly suspended therefrom, and a thrust and draft bar secured to the traction-axle bearings and passing through a bracket located upon the frame-work in front of and in line with the bearings, and provided with cushioning-springs located in front and in rear of said bracket, substantially as and for the purpose described.

3. In a traction-engine, the combination of the sills of a boiler-supporting frame and a traction-axle located above the sills, and provided with a bearing connected by suspension-rods to springs located below the sills, and having an inner flange adapted to bear against the housings, with a thrust and draft bar, comprising an inner and an outer plate, arranged to embrace a portion of the housings, and connected to cushioning-springs arranged in line with the traction-axle bearing, substantially as and for the purpose described.

4. A traction-axle bearing-box bored vertically for the reception of suspension-rods, and bored transversely for connection with a horizontal thrust and draft bar or bars, and provided with flanges, in combination with thrust and draft bars, substantially as shown and described.

5. The combination of the bearing-box D, bearing C, strap D', suspension-rods E, plate F, provided with flanges, sills B, springs G, and plate H under said sills, substantially as and for the purpose described.

6. The combination of the sills B, brackets K and B^2, the housing, and boiler, with a horizontal thrust and draft bar composed of plates, substantially as shown and described.

7. The combination, with the axle-bearing D, suspension-rods E, and springs G, of the springs M M', located upon horizontal bars, and arranged to be compressed by the forward and backward movement of the axle, substantially as and for the purpose described.

In testimony whereof I affix my signature, in presence of two witnesses, this 14th day of March, 1883.

FRANK F. LANDIS.

Witnesses:

D. M. GOOD, Jr.,

C. E. BESON.